Physical Modelling for Electronics Enclosures Using Rapid Prototyping

Prof. N.V. Chalapathi Rao
Department of Electronics Systems Engineering
Indian Institute of Science – Bangalore

Lecture - 19
3D Design 2 from Photo Snap

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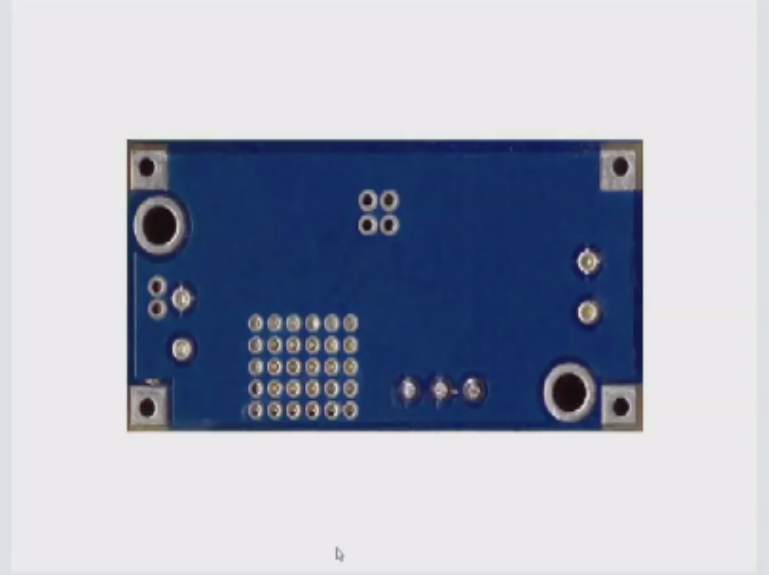

If you see here I have a picture of a circuit here, is there a way of my placing it on top of that? Yes, if I see the, I need to open this probably in paint, and cut off and make it look as close as we can to a, I have corrupted, I have a beautiful object which has been cropped. I am going to save it as just PC now comes little bit of what do you call I will say see I have a bit map which I can use it for whatever purpose.

This I will now try to take here and see what best I can do with it.

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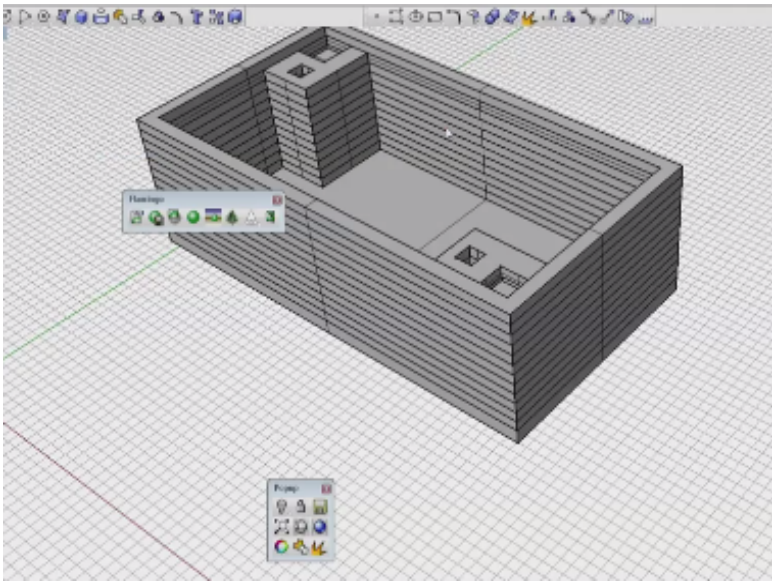

I will now create a plane on top of it, try to put this printed circuit board on top of it and see how well it sits here. Let me see the orientation, yes, orientation is this is long that side and in this case yeah. To me to simulate a small printed circuit board inside again go to the original drawing here and then try to unhide all those things in case I have them and then I will try to make a simple surface, a plane, move the plane up and you see this is where going to be little very interesting thing.

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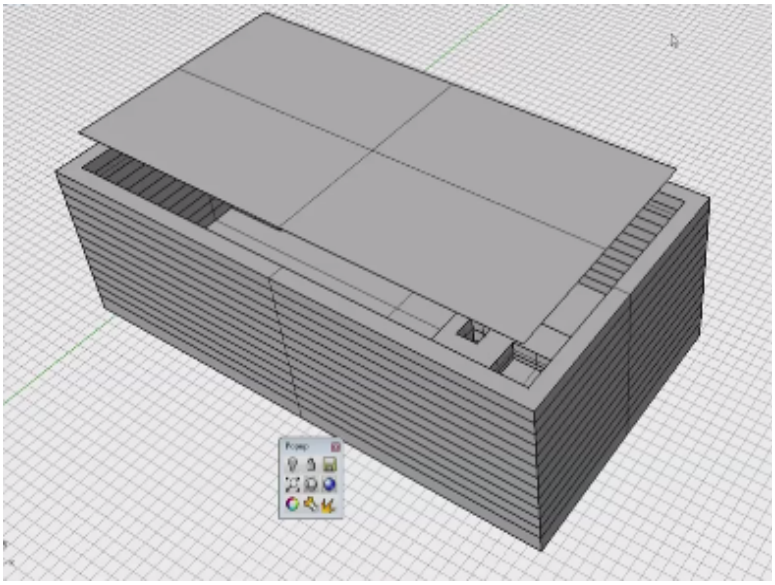

Any software package you will have the option of giving things a texture and giving things what you call real feel and all that. So I now go for this what you call giving this object property. I will select this, I will go for the basic material, I go for the basic thing and then go here for the, whether I can have a texture map. Right now I have this texture map built into it in this computer.

It has been attached to this now. Now you see when I try to give a rendering you see what will happen. There my printed circuit board is nicely sitting on top of it.

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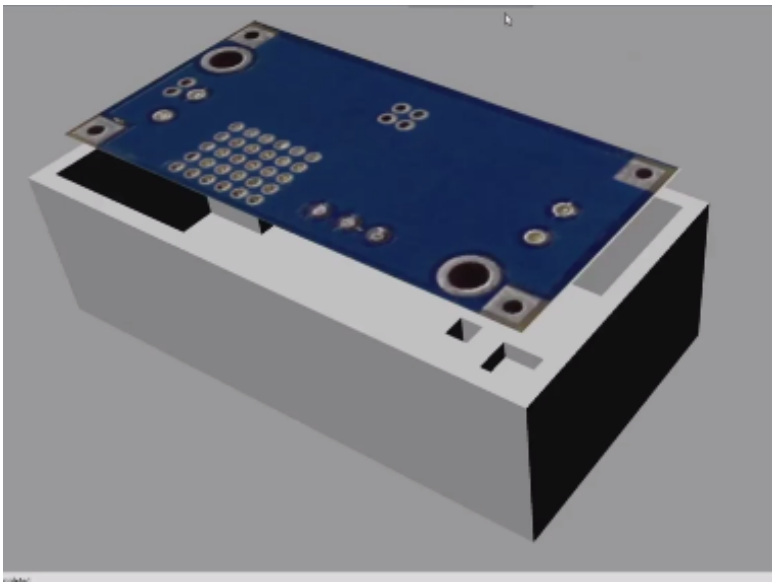

So I have a double advantage for me whatever I have started it is very much easy for me to check whether things are meeting or not. Similarly, since this is when made with some material so I will see if I can give in this case all the material is made of the same thing here. Now I will see whether I will try to give a basic material here and then I will see whether I can give similarly know a basic colour and maybe my print is going to be a dark blue box and then say okay and then now when I try to give a rendering you see here.

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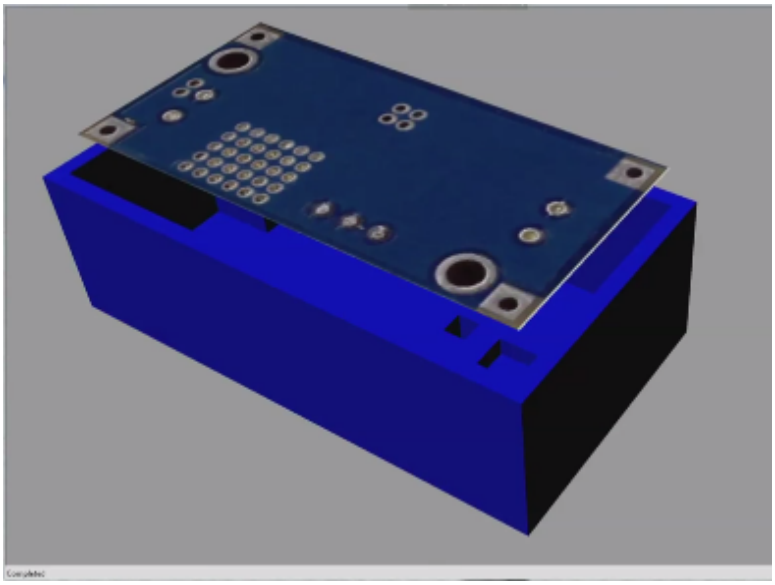

I have a blue box on which there is a nice printed circuit board which is sitting there. I can go on like this and then try to build more and more and more things on this. So what I will do is I will now try to lower this circuit down, not perfectly aligned, okay. So I probably need to remove this snap. Now it is slight better see.

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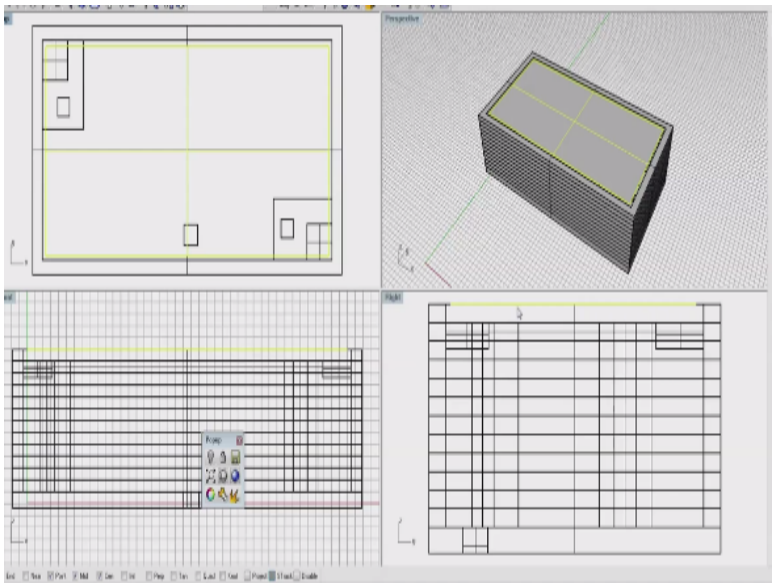

It is sitting nicely and then I can probably even lower it a little and now for practical purposes this is how my final units is going to look like, done.

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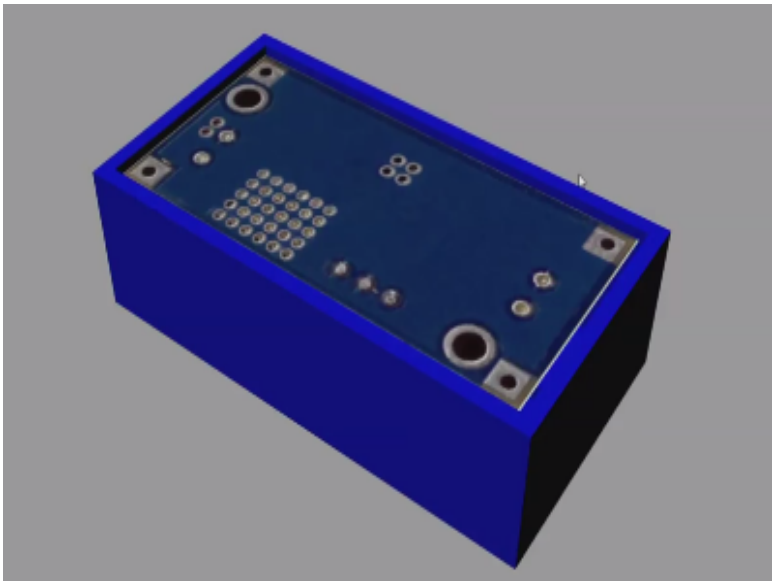

This is what actually 3D printing is all about. Now one more item I have what you call intentionally left off for you is do I now put a heat sink on top of it, yes, if you use the; remember the whole thing inside; now I have this 4 connections here, I have to decide whether I give a relief on the heat sink and then I have these 2 mounting holes.

Now I can use the heat sink and in this case know this is where the via holes are there and the manufacturer has recommended that we use the via holes, put a little bit of heat sink paste and you just clamp it down with suction force. So for me to do that I need to create the what you call heat sink plate on top of it and to make use of the extra area is available here. I am going to make a simple rectangular plate all along.

And then I am going to have these 2 holes and then we just need to clamp it. Except that you will notice a still we have this 4 corners which are likely to create a problem for us, seeing this know this 4 corners are likely to create a problem for us. So when I try to create a heat sink for this, I will continue to use this. There is no problem about it. It is a same plane; I can try the make a heat sinks out of it.

Except that my box if you see I make a box now, I make a plane which starts from corner to corner. I have one corner here, I have a corner here and then I have my, and that the 2 things which I am going to what do you call make use of in my design they are almost coplanar, both of them are sitting in the same plane. Why it is useful for me to make use of it is I come here now, I will make use of this 4 corners and see how best to avoid that shorting in the corners.

So one easy way is because we have a notching facility is very, very convenient for us to make a notch here. All we need to do is make another one more what you call rectangle. I will go a little faster, see that much of a notch I need to give so that the heat sink does not short. So I will now copy this to the like before, I mirror this and at this point I, because easiest for me you know is take this again take this to mirror it again.

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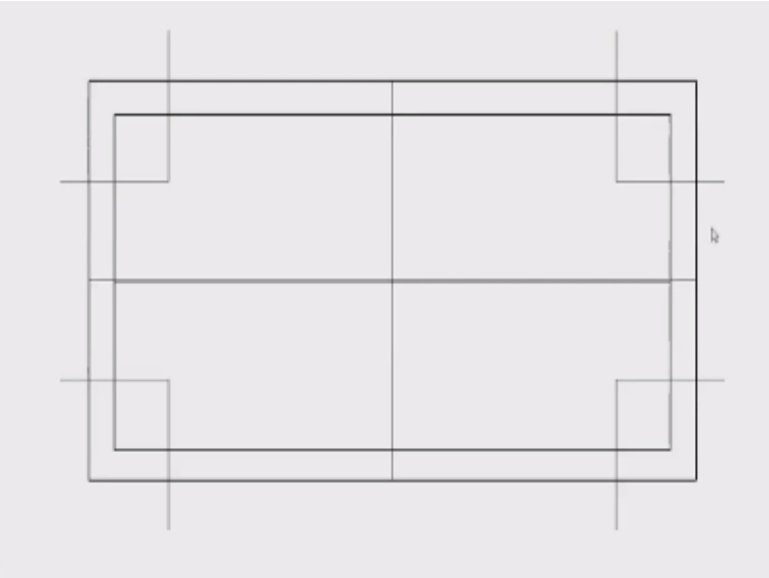

See here I am getting better at, I will now go here and try to what you call cut the surfaces completely, I select all these objects which I can use for notching of notch corner, corner, corner, corner, you see here I have a nice heat sink where the corners are beautifully taken care of and if I switch on the other layers at the bottom even the mounting holes can be there. If you remember, one mounting hole was here and another mounting hole was here and the whole thing.

So what I will do is now I you know open this and try to and unlike they build up earlier I can have the luxury of having a full drilled hole. Advantage of a drilled hole being as always in the work shop, it is very easy to drill such things. See this I now try to, now I need only this, this, and my outline, oh sorry, it was very much there it is just that it is hiding it has decided to hide itself underneath.

So most likely it is somewhere here, allow me to unhide everything and get back, it cannot trick me. It is sitting here at the bottom most like this. See that hole is got created at the bottom most part of the thing which I am talking about.

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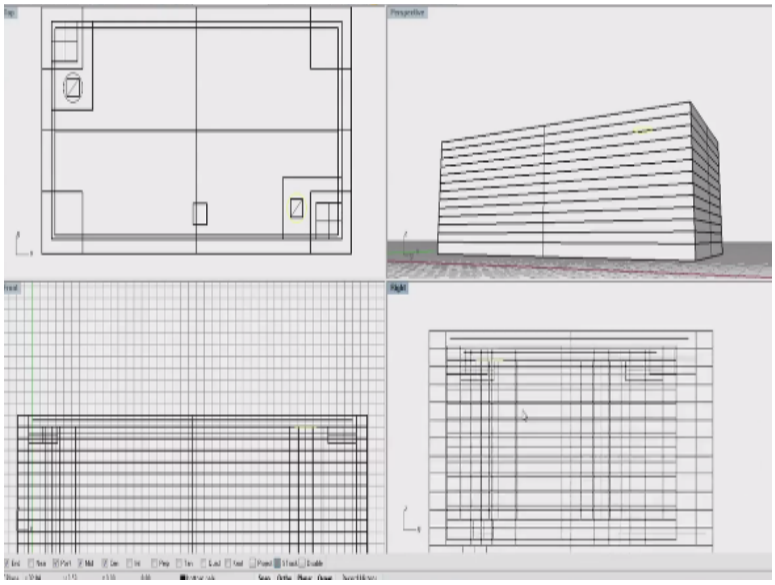

I probably need to move it. Come on layer where are you? Finally, I got them here, now it cannot escape. See here I have this opening here, I have this opening here and then I have what is part of the heat sink on top. So I now try to do what I try to do earlier, see. Due to some technicality it works best only as a what you call bullion operation because for some reason these things do not.

I cannot what you call, I cannot see the plane there so normal way of trimming does not seem to help. However anyways since eventually I need to convert it into a thick plate, I will make it into a 2 millimeter aluminum plate. Now I will extrude the solid, I have 2 millimeter aluminum plate then I make a solid out of these curves and make openings by making a difference, sorry it has gone and picked the wrong thing.

So I will make a difference. So again I will check first set yeah, now second set of poly holes done and then these two I hide.

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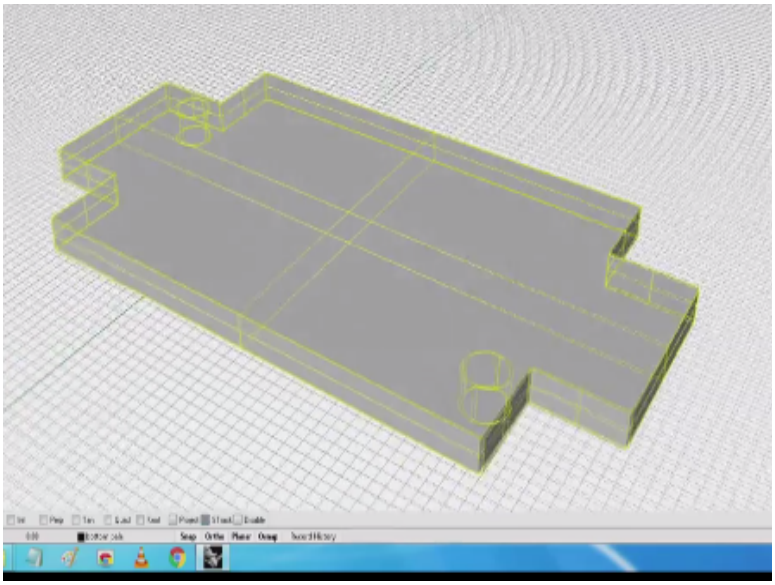

And this being a sheet metal and we cannot just leave it, hey what happened, oh it is back luck, oh it is not a bad luck it is a matter when I developed that surface know that surface ended up with some problems. Now this being a sheet metal part. It invariably requires the filling parts. So I will fill it this edge by in fact I will give a very generous fill it. So if you kindly look at my working monitor a little bit of audio was lost I will see what I can do.

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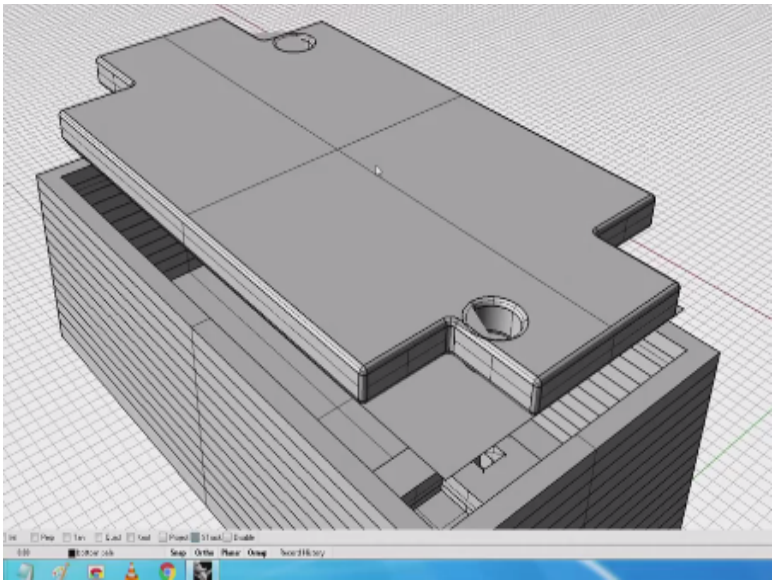

You will notice here that this object which I have tried to create ended up with completely going off stitch you have seen this. This is supposed to be the heat sink, due to some I cannot say whatever reason it is, it has not come out well. Now I will try to reconstruct it by going here and seeing what best I can do with it. One of the easiest thing is probably to start with a polyline and I will disable the old snap.

I have got a reasonably what do you call well defined I will think probably input my diameter by hand. So I have got a circle here I will now copy this circle with respect to this center to the other point and the other big object that I have created I will delete it. I will come back to where I have started. The problem that happened was because I tried to do a chamfer and it did not come out well and I ended up with an opening here.

So this time I will see whether I will create a different what you call solid with directly from these objects and then I will try to extrude the planar curve, this is 1 millimeter. I will make a 2 millimeter sheet here. The circles were not in plane so I will now bring the circles back to plane. Much is here to do the bullion operation. I try to extrude this into solid, this curve I will make a solid out of solid.

Extrude planar curve straight. I have a 2 millimeter plate in which you know I will try to remove this material by making a bullion operation. So when I make this bullion operation one of the first thing that will happen is seen that know, we will have that nice holes which will take place very well see I have got this nice openings.

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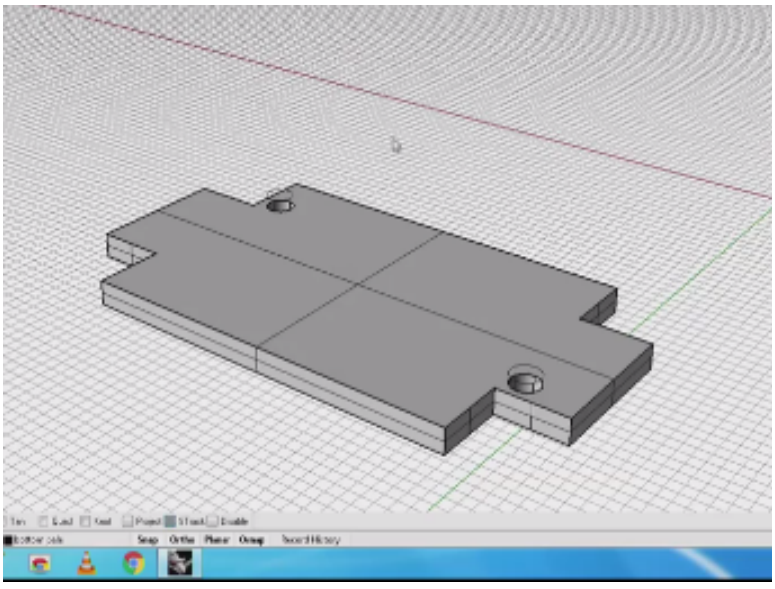

Now I will go back and you know what you call unhide the whole lot which I have here. You have seen this here this where we were starting. Now I just got a brainstorm when I went to followup the other thing here saying if you were building a heat sink on top here why just leave it just for the what you call. Why do we need to just open the, seen that know? Why do we need to just leave this for this and why not I give a corner support here so that anyway since material is there.

So I will just take this small thing up a little make it flush. See I have got 2 more 1 millimeter slices which are built here. So I will remove this from this material here. I will try to do a solid what you call bullion difference here. From this ring object I will see if I can remove this and what will remain about it. You see I have a nice something which looks as if you know it is going to fit inside.

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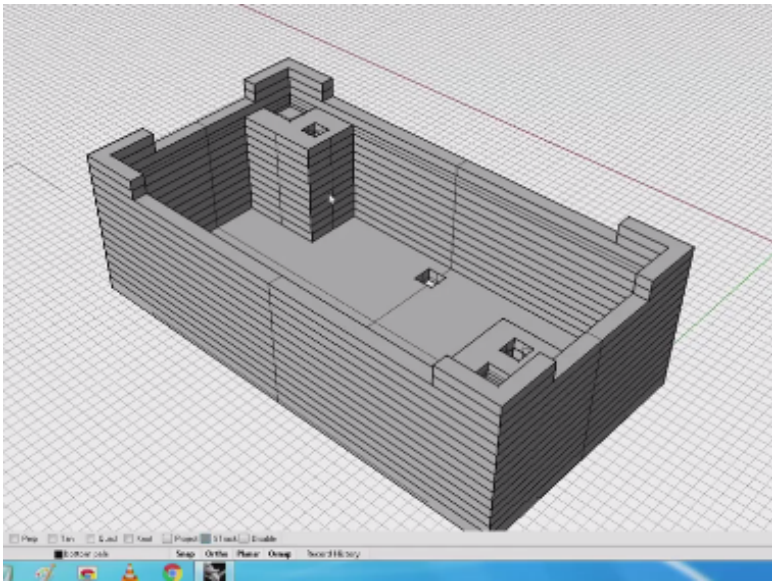

So it is going to look fine and then just now I was again checking back with my what I call colleague downstairs what he has suggested is that all this you know building up is amounting to too much of material and time, it says the build-up may take about you know because the resolution it may take almost an hour. So why do not you remove all this materials.

So eventually I will probably have a very, very extremely simple object which I will try to recreate and show you later. Right now let me undo this, you have seen this know, I need to copy one object, hide it, so that I continue to have it now. Do the bullion with these things? See now you will notice that I do have the object what I wanted to create and in this case know they also represents what you call the various layers.

And then now I take this cover over and the cover sits very comfortably here and when I actually fire the job when I go there I will probably even remove I will remove all this, what you call unwanted thing here because he has showed me that all this much of support will

really not help except in what you call wasting a lot of material. So eventually I am going to have something which sits and then as I told you before it is going to be fine.

I am going to have a beautiful unit which the top version is now going to be the heat sink which sits there then I will also make what you call counter sink or a counter bore so that everything is flushed and in fact this where a little bit of you know improvement can be done.
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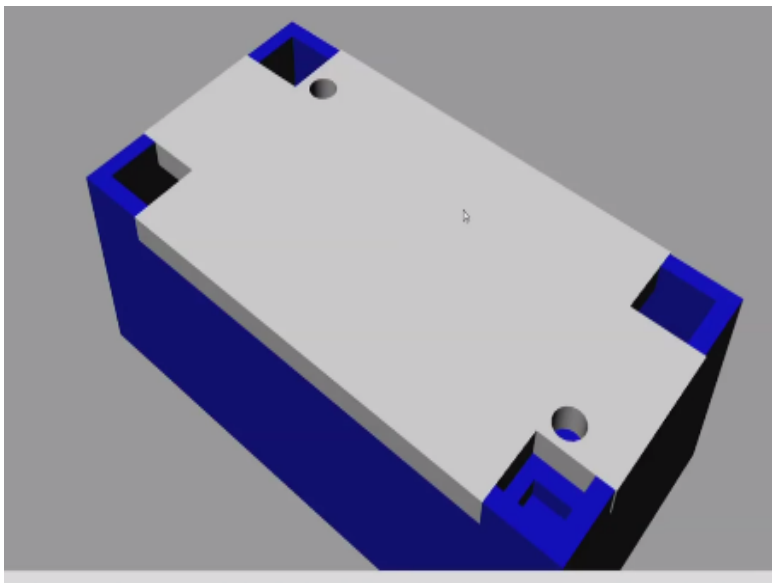

Saying once you have a heat sink and once you have a printed circuit board and all that why you need this 4 corners at all for anything. Why cannot the unit be built directly on to the heat sink you understand know and a cover can be placed over it. Imagine this whole thing. So I can have the unit attached to a heat sink I input a small cover on that. This is going to be a simpler object in that.

So I have this 4 mounting holes, I put something for the cover and see how well I can attach the cover back to this. This is how actually happens when we have other objects there. See this know it sits quite comfortably. Okay, I mount it on a heat sink and then I put the cover on top of it. So in this way I optimize probably know, optimize the whole thing. I do not even need all these things like this.

I can probably have a what you call a simple device which what you call sits and after the wiring is over I put the lid over top of it and then provide some other arrangement by which I make it you know clamp on to the printed circuit board. Now you see here I have 2 more

units which I have brought. See here this is the one I am taking about. I will have this mounted on to the heat sink and I put a lid over it and over all I have a beautiful project.

And how do I put it on the heat sink, just put a plate, I have this 2 small what you call opening so I will probably need to tap it and then put a screw from this side so it sits here and this will go and snap into the cover on that. You see my design has been simplified.

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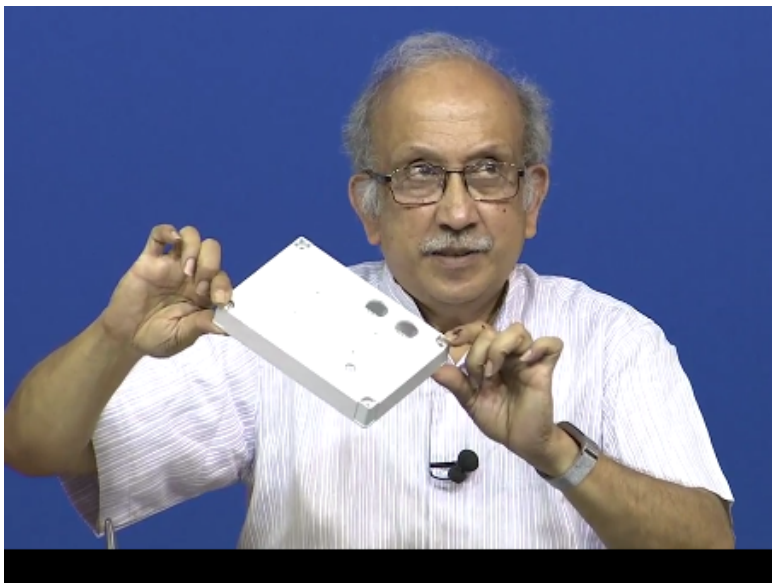

Now take a look at this small thing, while this is not been made by what you will say rapid prototyping specifically it has not been made by 3D printing this is typically a fully sealed IP 60 probably 56 and 56 box maximum generally overall it is and even here you notice there is a lot of thing attention has been made for making a groove all around here. There is a rubber gasket and a groove here and as it is we may not be able to use it so much that is the reality and finally assembly is probably going to look like this.

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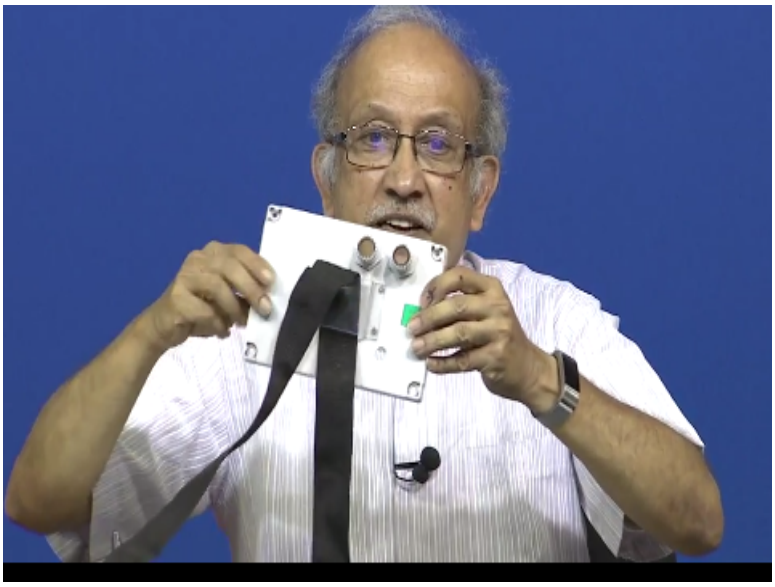

What do we have here? We have 2 gland nuts. This gland nuts are separate pieces okay, this gland nut as I called it like thing here. I need to do something when I tighten it, it will sequence the cable and make sure that everything is, see here I have a gland nut and then I also have a strap. This strap goes and I can use it for tying it to a tree or anything and now if you recollect yesterday in one of the demonstrations this was shown.

Do you remember this, this whole thing was shown there, that was a standard demonstration? It is unlikely that people will ever make this you know what you call things which are easily available on to make it in rapid prototyping though you have a file know, not tie because the whole thing is probably available for a few cents, a good quality one maybe 50 cents and a poor quality thing may be only 5 or 10 cents and things which we cannot do or probably this sort of thing.

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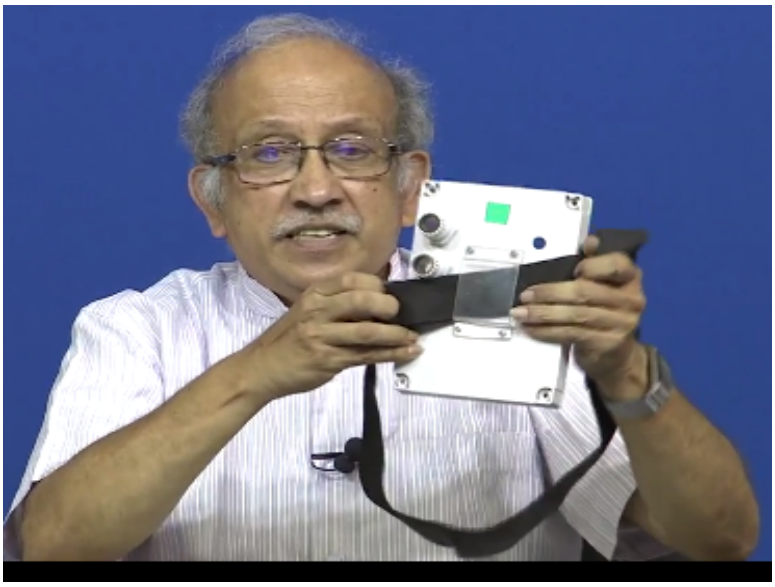

There is a strength and transparent show here we have a, this thing has been, section has been made out of polycarbonate so that you can bend it and you can put it inside like this now slowly some of the machines will give you the same amount of the called thing here. So allow me to stop here okay. Tomorrow a modified variants of this I will try to load there on the machine and show you various ways of how this thing can be done.

Including as I said after talking everything originally we just wanted to put it here and put a cover and the moment this heat sink thing has come and since we need to play with it decided why cannot we put it as it is here like this mount it on the heat sink and put a cover. In case we do not have the heat sink, we just need only a what I call insulated printed cover maybe we can even make it such that it is snap fit.

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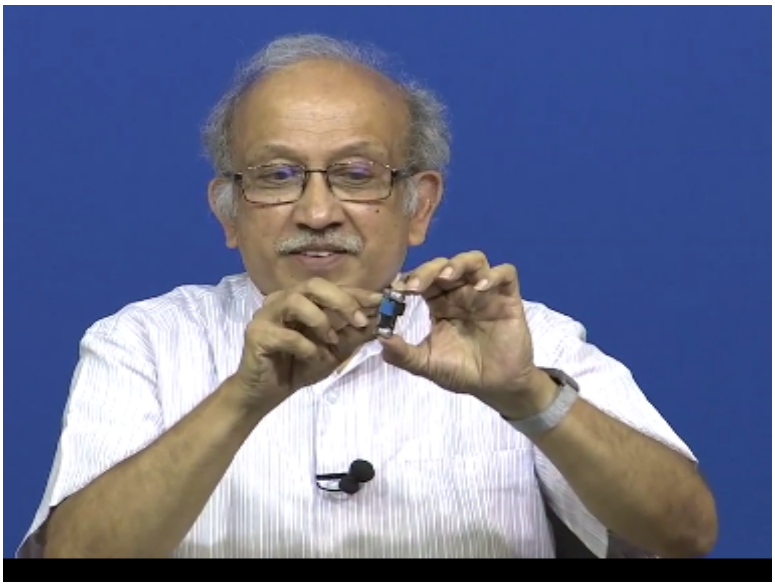

Like this goes into one part of the cover and then if you have these 2 openings here okay those things there is a small button. This will go and snap into that button once the whole thing snaps here and then I bring the other part okay, which those things nicely slide here and then I have 2 things which are basically very simple design and no support is required and overall the amount of effort required in manufacturing will be very, very simple.

So I will see if I can what you call create the whole thing before the next what you call session and then see how I can show you simplified design. So thank you, this section know this part of it on how to take a print, you understood know.

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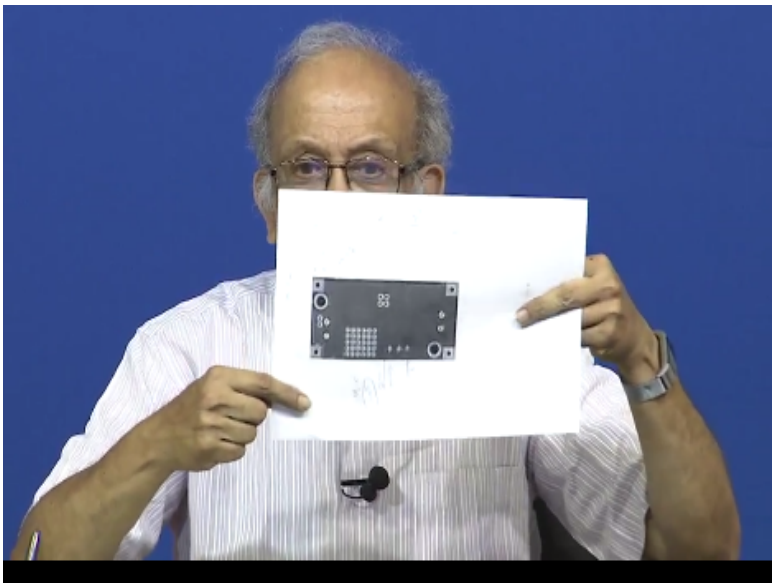

I have taken a scan and then as best as possible I have tried to transfer all this items on to this taking actual dimension and then I tried to create a model by making use of this and then this is how typically technical what you call 3D printing needs to be taken place. It is not just downloading a file and hoping things will work. Very, very critical.

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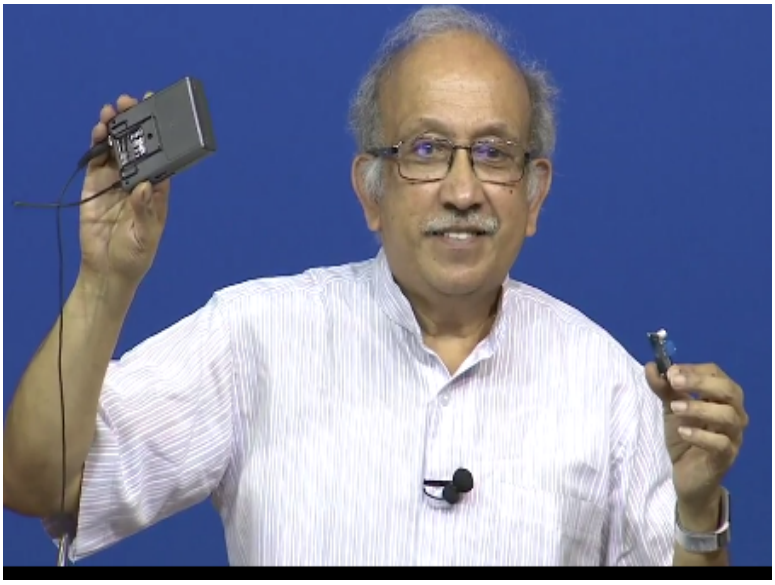

Otherwise things like this would not have happened.

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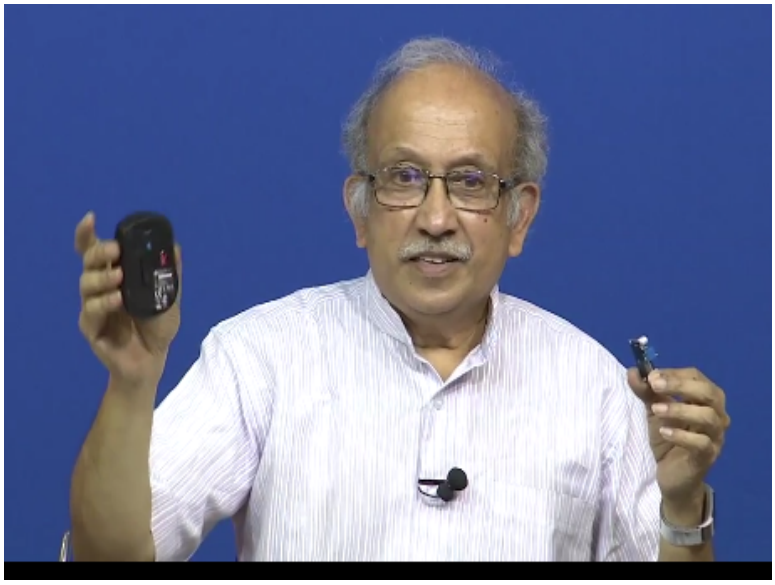

Very complicated piece now it is you know available same thing, not easy. Okay so thank you we will continue with this in the next session thank you.